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Stanford University

Environmental Earth System Science
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EDUCATION

Ph.D. Hydrology, Dept. of Geological Sciences, Stanford University, 1981
M.S. Hydrology, Dept. of Geological Sciences, Stanford University, 1977
B.A. New College, 1975

PROFESSIONAL EXPERIENCE

2007-present **Professor of Environmental Earth System Science, Stanford University**
2010-present **Senior Fellow, Woods Institute for the Environment, Stanford University**
1996-2007 Professor, Dept. of Geological & Environmental Sciences and
 Dept. of Geophysics, Stanford University
 2012 Visiting Professor, Centre for Ecohydrology, UWA, Perth, AU (spring)
 2009 Visiting Scientist, CSIRO, Land and Water, Perth, AU (spring-summer)
 2007 Visiting Scholar, University of Cambridge, Dept. of Zoology (spring-summer)
 2006 Visiting Professor, Ecole Polytechnique Federale de Lausanne (EPFL),
 Ecological Engineering Laboratory, Switzerland (spring-summer)
 2005 Visiting Professor, Swiss Federal Institute of Technology (ETH), Zurich
 (spring-summer)
 1997 Visiting Scholar, Harvard University, Division of Engineering and
 Applied Sciences (winter)
 1997 Visiting Scientist, CSIRO, Perth, AU (spring-fall)
1993-1996 Associate Professor, Dept. of Geological and Environmental Sciences,
 and Dept. of Geophysics, Stanford University
1988-93 Associate Professor of Applied Earth Sciences, Stanford University
 Associate Professor of Geophysics, Stanford University (appt. 1991)
 1981-88 Consulting Professor, Applied Earth Sciences, Stanford University
 1981-88 U.S. Geological Survey, Water Resources Division
 Project Chief (1982-88), Assistant GW Research Advisor (1986-88)
 1977-80 Hydrologic Consultant

HONORS AND AWARDS

2012 **Member**, US National Academy of Engineering
 2012 **Vice Provost Visiting Professor**, University of Western Australia
 2011 **International Fellow**, Institute for Envir. Sci. and Res, ESR, New Zealand
 2008 **Fulbright Fellow – Senior Scholar**, Australian-American Program
 2005 **Fellow, John Simon Guggenheim Foundation**
 1997 **Fulbright Fellow – Senior Scholar**, Australian-American Program
 1990 **Fellow**, American Geophysical Union

1988	Fellow , Geological Society of America
2008	Chester Keisel Memorial Lecturer , University of Arizona
2008	Pioneers in Groundwater , Environmental and Water Resources Institute of the American Society of Civil Engineers (ASCE).
2006	Award , International Association for Mathematical Geology, Best Published Paper in <i>Computers and Geosciences</i> in 2005
2005	Cyrus F. Tolman Professorship , Stanford University
2004	M. King Hubbert Award , National Groundwater Association
1998	Ineson Distinguished Lecturer , Intl. Assoc. Hydrogeologists, UK & BGS
1994	O.E. Meinzer Award , Geological Society of America
1990	James B. Macelwane Medal , American Geophysical Union
1989	Presidential Young Investigator Award , The White House and the National Science Foundation
1987-97	President , International Commission on Groundwater

ASSOCIATE EDITORSHIPS

Water Resources Research (1983-1987)
Journal of Hydrology (1990-1996)
Hydrogeology Journal (1999-2002)
Transport in Porous Media (2002-2004)
Optimization and Engineering (1999-present)

PROFESSIONAL ACTIVITIES SINCE 1990

1988-90	<u>Member, Geohydrology Panel</u> , National Research Council Committee on Solid Earth Sciences
1988-90	<u>Scientific Committee</u> , International Conference on the Scientific Basis for Water Resources Management, Beijing, China, 1990
1989	<u>Scientific Program Committee</u> , International Symposium on Groundwater Management: Quantity and Quality, Spain
1989	<u>Invited Presentation</u> , STL, Advance Education Seminar, IBM Lab
1989-90	<u>Co-Convenor</u> , Geologic Characterization of Media Heterogeneity for Improved Prediction of Subsurface Transport, AGU Special Session
1989-90	<u>Invited Speaker</u> , International Conference on Calibration and Reliability in Groundwater Modelling, The Hague, The Netherlands
1989-90	<u>Advisory Committee</u> , International Conference on Groundwater Resources Management, Bangkok, Thailand, 1990
1989-95	<u>Faculty Member</u> , EPA, Western Region Hazardous Substance Research Center, Stanford University and Oregon State University.
1990-91	<u>Member</u> , National Science Foundation Geology and Paleontology Panel
1990	<u>Workshop Leader</u> , DOE Meeting on Groundwater Monitoring Network Design
1990-91	<u>Groundwater Technical Advisory Committee</u> , CH2M HILL modelling of Santa Clara Valley, California

1991	<u>Invited Presentations</u> , University of Michigan, U.C. Berkeley, & EPA
1991-92	<u>Member</u> , National Science Foundation Continental Hydrology Panel and Hydrologic Sciences Panel
1992-1993	<u>Member</u> , AGU Water Resources Research Editor Selection Committee
1992-2009	<u>Member</u> , U.S. National Committee for IAHS
1992-1994	<u>Member</u> , AGU Horton Medal Committee
1992-93	<u>Scientific Advisory Committee</u> , International Conference on Groundwater Quality Management, Estonia
1992-93	<u>Advisor</u> , UNESCO International Hydrologic Program Planning Group
1992-94	<u>Member</u> , Battelle Labs Technical Support Group - Arid Zone VOC Integrated Demo
1992-94	<u>Member</u> , Geostatistics Experts Group & Conceptual Model Uncertainty Group, Sandia Labs
1993	<u>Instructor</u> , Design of Groundwater Contaminant Capture Systems: Decision Analysis and Optimization (w/ A.Freeze, L.Smith, & J.Massmann), E-Cubed, Chicago
1993-94	<u>International Scientific Committee</u> , Assessing and Managing Health Risks from Drinking Water Contamination, Rome, Italy
1993-94	<u>Scientific Advisory Committee</u> , International Conference on Future Groundwater Resources at Risk, Helsinki, Finland
1995	<u>Invited Speaker</u> , Kovacs Colloquium, Paris, 1995
1995	<u>Invited Instructor</u> , ETH, Swiss Federal Institute of Technology, 16th International Course, Pollutant Transport and Management in Heterogeneous Aquifers, (w/ J. Wilson)
1995	<u>Keynote Speaker</u> , International Conference on Groundwater Quality: Remediation and Protection, Prague, 1995
1995-1997	<u>Member</u> , California Environmental Protection Agency Risk Assessment Advisory Committee of the Office of Environmental Health Hazard Assessment Science Advisory Board
1995-1996	<u>Scientific Advisory Committee</u> , Model Calibration and Reliability Conference, Golden, CO.
1995-1997	<u>Scientific Program Committee</u> , IAHS Scientific Assembly, Morocco.
1995-1998	<u>Member, Chair</u> , Meinzer Award Committee, Geological Society of America
1996	<u>Invited Speaker</u> , Geologisches Institut, Universitat Tuebingen, Germany
1997	<u>Visiting Scholar</u> , Harvard University, Division of Engineering and Applied Sciences
1997	<u>Visiting Scientist</u> , CSIRO, Perth, Australia
1997	<u>Visiting Professor</u> , University of Western Australia, Perth
1997	<u>Invited Speaker</u> , MIT, Harvard, University of Paris, USGS (Reston), CSIRO Perth, CSIRO Canberra, Intl. Association of Hydrogeologists Perth, Univ.of Western Australia/Envir. Dynamics Seminar, Institute of Engineers Melbourne, CSIRO Adelaide, Intl. Assoc. Hydrogeologists Sydney.

1997	<u>Instructor</u> , Aquifer Heterogeneity and Optimal Capture of Contaminants, short course, University of New South Wales, Sydney, Australia (with J.L. Wilson and L. Townley).
1997	<u>Keynote Speaker</u> , MODSIM 97, Hobart, Tasmania.
1997	<u>Invited Speaker</u> , 1997 International Conference on Groundwater Quality Protection : Technology and Management of NAPL Problems, Taiwan
1997-1999	<u>Member</u> , Scientific Committee, ModelCARE Conference (Joint IAHS/IAHR), Zurich, Switzerland, Sept. 1999.
1998	<u>External Examiner</u> , Ph.D. Committee, Technical University of Denmark.
1998	<u>Invited Speaker</u> , Groundwater Research Centre, Technical University of Denmark
1998	<u>External Juror</u> , Ph.D. Jury, University of Paris, France
1998-2000	<u>Member</u> , Scientific Advisory Committee, Groundwater 2000: Conference on Groundwater Research, Copenhagen, Denmark, June 2000.
1998-2000	<u>Chair/Consultant</u> , Review Panel for Groundwater Model for Hanford Site, Washington, PNNL/DOE.
1999-2000	<u>Member</u> , National Research Council Panel on Grand Challenges in Environmental Sciences Research.
1999	<u>Member</u> , Expert Panel to Review Minimum Flows and Water Levels Used for Regulatory Purposes in Southwest Florida.
1999-01	<u>Scientific Advisory Committee</u> , International Conference on Future Groundwater Resources at Risk, Lisbon, Portugal, 2001
2000	<u>Invited Lecturer</u> , The Johns Hopkins University
2000-2001	<u>Member</u> , Hydrogeology Program Planning Group, Ocean Drilling Program/Joint Oceanographic Institutions (JOIDES) for Deep Earth Sampling
2001-2002	<u>Member</u> , Scientific Advisory Committee, ModelCARE 2002, Prague
2001-2008	<u>Representative</u> , from Stanford University to Consortium of Universities for the Advancement of Hydrologic Science, Inc. (CUAHSI)
2001-2004	<u>Advisor</u> , Regional Aquifer Model Development, Texas Water Development Board
2002-2003	<u>Member</u> , CUAHSI Executive Director Search Committee
2002-2004	<u>Member</u> , Hydrology Section AGU Fellows Committee
2002-2010	<u>Advisor</u> , Evaluation of Demand Uncertainty in Optimal Groundwater Management in Southwest Florida, Tampa Bay Water
2002-2004	<u>Member</u> , Hydrology Section AGU Fellows Committee
2003	<u>Member</u> , CUAHSI, Audit Committee an Legal Affairs Charter Mission Review Group
2003	<u>Invited Lecturer</u> , US Geological Survey Water Resources Division Seminar Series
2003-2004	<u>Member</u> , Scientific Advisory Committee, Finite Element Modeling and Modflow Conference, Carlsbad, Czech Republic
2004	<u>Invited Speaker</u> , UC Davis Distinguished Speaker Series

2004	<u>Invited Speaker and Panel Discussant</u> , Finite Element Modeling and Modflow Conference, Carlsbad, Czech Republic
2005	<u>Invited Lecturer</u> , University of Barcelona, Swiss Federal Institute of Technology (ETH), and Swiss National Research Center for Water Pollution Control (EAWAG)
2005	<u>Public Lecture</u> , Stanford University, The End of Oil series
2006	<u>Invited Lecturer</u> , Ecole Polytechnique Federale de Lausanne (EPFL), Ecological Engineering Laboratory, Switzerland
2007	<u>Invited Lecturer</u> , University of Paris, Université Pierre et Marie CURIE
2007	<u>Invited Lecturer</u> , Cambridge Conservation Forum, University of Cambridge
2007-2008	<u>Member</u> , Scientific Advisory Committee, <i>HydroPredict 2008</i> , Prague
2008	<u>Invited Plenary Lecturer</u> , World Environmental & Energy Conference, ASCE, Hawaii
2008	<u>Public Lecture</u> , Stanford University, Troubled Waters series
2008	<u>Member</u> , Peer Review Panel, National Science Foundation, Hydrologic Sciences
2009	<u>Invited Lectures</u> , University of Western Australia, School of Environmental Systems Engineering; CSIRO, Division of Land and Water; Engineers of Western Australia; International Association of Hydrogeologists, Perth, AU; USGS, Menlo Park.
2009 - present	<u>Director</u> , Global Freshwater Initiative, Woods Institute for the Environment, Stanford University
2009-2010	<u>Member</u> , Scientific Advisory Committee, <i>HydroPredict 2010</i> , Prague
2010	<u>Member</u> , Visiting Committee, Dept. of Earth Sciences, Dartmouth College
2010 - present	<u>Member</u> , Water Advisory Board, Natural Capital Project
2011	<u>Search Committee</u> , Hydrologist, Natural Capital Project
2011	<u>External Reviewer</u> , Doctorate of Xiang Zhao Kong, Swiss Federal Institute of Technology, ETH, Zurich
2011	<u>Invited Lecturer</u> , Environmental Science Research (ESR), New Zealand
2011	<u>Keynote Speaker</u> , River Corridor Restoration Conference – RCRC11, Monte Verità, Ascona, Switzerland
2011- present	<u>Member</u> , AGU Hydrology Section, Water and Society Technical Committee
2011- present	<u>Member, Scientific Advisory Board</u> , NIREAS International Water Center, Cyprus
201	<u>Invited Lectures</u> , Swiss Federal Institute of Technology (ETH Zurich), École Polytechnique Fédérale de Lausanne (EPFL), Switzerland, University of Paris – VI, California Independent Petroleum Association, Chevron Retirees Association, and Chevron Fellows meeting
2011	<u>Co-Organizer</u> , AGU Session, Assessing Global Soil Change, Impacts on Hydrological and Ecosystem Services
2011	<u>Co-Organizer</u> , AGU Session, Water and Society
2012	<u>Invited Lecture</u> , Nanyang Technological University, Earth Observatory of Singapore

2012	<u>Invited Lecture</u> , Prediction Under Change Workshop : Visionary Speaker, Boulder, Colorado
2012	<u>Plenary Lecturer</u> , 34 th International Geologic Congress, Brisbane, Australia
2012	<u>Invited Lecture</u> , Centre for Ecohydrology, University of Western Australia
2012	<u>Invited Lecture</u> , CSIRO, Division of Land and Water, Perth, Australia

PUBLICATIONS:

- Gorelick, S.M., I. Remson, and R.W. Cottle. 1979. Management model of a groundwater system with a transient pollutant source. *Water Resources Research*. vol. 15, no. 5, p. 1243-1249.
- Remson, I. and S.M. Gorelick. 1980. Management models incorporating groundwater variables. In: D. Yaron and C.S. Tapiero, eds., *Operations Research in Agriculture and Water Resources*. North Holland Publishing Co., Amsterdam, The Netherlands, p. 333-356.
- Remson, I., S.M. Gorelick, and J.F. Fliegner. 1980. Computer models in groundwater exploration. *Groundwater*. vol. 18, no. 5, p. 447-451.
- Remson, I., and S.M. Gorelick. 1982. Hydrologic issues in repository siting: In: P.L. Hofmann, ed., *The technology of high-level nuclear waste disposal: Advances in the Science and Engineering of the Management of High-level Nuclear Waste*. vol. 2, p. 46-52.
- Remson, I., and S.M. Gorelick. 1982. Optimal location and management of waste disposal facilities affecting groundwater quality. *Water Resources Bulletin*. vol. 18, no. 1, p. 43-51.
- Gorelick, S.M. 1982. A model for managing sources of groundwater pollution. *Water Resources Research*. vol. 18, no. 4, p. 773-781.
- Remson, I., and S.M. Gorelick. 1982. Optimal dynamic management of groundwater pollutant sources, *Water Resources Research*. vol. 18, no. 1, p. 71-76.
- Gorelick, S.M., and S. Gustafson. 1983. Linear models for managing sources of groundwater pollution. In: *Proceedings of the Computational Techniques and Applications Conference*, Sydney, Australia.
- Gorelick, S.M. 1983. A review of distributed parameter groundwater management modelling methods. *Water Resources Research*. vol. 19, no. 2, p. 305-319. (Reprinted by United Nations, *Water Resources Journal*, December 1985, p. 18-32)

- Gorelick, S.M., B.J. Evans, and I. Remson. 1983. Identifying sources of ground-water pollution: An optimization approach. *Water Resources Research*. vol. 19, no. 3, p. 779-790.
- Gorelick, S.M., C.I. Voss, P.E. Gill, W. Murray, M.A. Saunders, and M.H. Wright. 1984. Aquifer reclamation design: The use of contaminant transport simulation combined with nonlinear programming. *Water Resources Research*. vol. 20, no. 4, p. 415-427.
- Gorelick, S.M., B.J. Evans, and I. Remson. 1984. Reply to comment of D. A. Woolhiser on "Identifying sources of groundwater pollution: An optimization approach." *Water Resources Research*. vol. 20, no. 6, p. 745.
- Atwood, D.F., and S.M. Gorelick. 1985. Hydraulic gradient control for groundwater contaminant removal. *Journal of Hydrology*. vol. 76, no. 1, p. 85-106.
- Atwood, D.F., and S.M. Gorelick. 1985. Optimal hydraulic containment of contaminated groundwater. *Proceedings of the National Water Well Association 5th National Symposium on Aquifer Restoration and Groundwater Monitoring*. p. 328-344.
- Danskin, W.R., and S.M. Gorelick. 1985. A policy evaluation tool: Management of a multi-aquifer system using controlled stream recharge. *Water Resources Research*. vol. 21, no. 11, p. 1731-1747.
- Gorelick, S.M. 1985. Book Review: Groundwater Quality, C.A. Ward, W. Giger, and P.L. McCarty, eds. *Water Resources Bulletin*. vol. 21, no. 6, p. 1060-1067.
- Gorelick, S.M. 1985. Contaminant transport models for groundwater quality simulation. *Keynote Paper*, International Association of Hydrogeologists 18th Congress, Hydrogeology in the Service of Man. p. 238-249.
- Lefkoff, L.J., and S.M. Gorelick. 1985. Rapid removal of groundwater contaminant plume. In: K.D. Schmidt, ed., *Groundwater Contamination and Reclamation*. p. 125-131.
- Rice, W., and S.M. Gorelick. 1985. Geologic inference from flow net transmissivity determination: Three case studies. *Water Resources Bulletin*. vol. 21, no. 6, p. 919-930.

- Gorelick, S.M., and B.J. Wagner. 1986. Evaluating strategies for groundwater contaminant plume stabilization and removal. *Selected Papers in the Hydrologic Sciences*. WSP no. 2209, p. 81-89.
- Lefkoff, L.J., and S.M. Gorelick. 1986. AQMAN: Linear and quadratic programming matrix generator using two-dimensional ground water flow simulation for aquifer management modelling. *Water Resources Investigation* 86-4016. 164 p.
- Solow, A.R., and S.M. Gorelick. 1986. Estimating missing streamflow values by cokriging. *Mathematical Geology*. vol. 18, no. 8, p. 785-809.
- Umari, A.M.J. and S.M. Gorelick. 1986. The problem of complex eigensystems in the semianalytic solution for advancement of time in solute transport simulations: A new method using real arithmetic. *Water Resources Research*. vol. 22, no. 7, p. 1149-1154.
- Wagner, B.J. and S.M. Gorelick. 1986. A statistical methodology for estimating transport parameters: Theory and applications to one-dimensional advective-dispersive systems. *Water Resources Research*. vol. 22, no. 8, p. 1301-1316.
- Lefkoff, L.J., and S.M. Gorelick. 1986. Design and cost analysis of rapid aquifer restoration systems using flow simulation and quadratic programming. *Ground Water*. vol. 25, no. 6, p. 777-790.
- Gorelick, S.M., ed. 1986. *Conjunctive Water Use: Understanding and Managing Surface Water-Groundwater Interactions*. International Association of Hydrologic Science Press, Publication no. 156, Wallingford, United Kingdom, 547 p.
- Umari, A.M.J. and S.M. Gorelick. 1986. Evaluation of the matrix exponential for use in ground-water-flow and solute-transport simulations: Theoretical framework. US Geological Survey. *Water Resources Investig.* 86-4096, 33 p.
- Gorelick, S.M. 1987. Sensitivity analysis of optimal groundwater contaminant capture curves: Spatial variability and robust solutions. Proceedings of the National Water Well Association Conference, *Solving Ground Water Problems with Models*. p. 133-146.
- Wagner, B.J., and S.M. Gorelick. 1986. Optimal groundwater quality management under parameter uncertainty. *Water Resources Research*. vol. 23, no. 7, p. 162-1174.

- Gorelick, S.M. 1988. A review of groundwater management models. In: G.T. O'Mara, ed., *Efficiency in Irrigation: The Conjunctive Use of Surface and Groundwater Resources*. The World Bank, Washington, D.C., p. 103-120.
- Gorelick, S.M. 1986. Incorporating assurance into groundwater quality management models. In: E. Custodio, A. Gurgui, and L.P. Lobo Ferreira, eds., NATO ASI Series, Mathematical and Physical Sciences. *Groundwater Flow and Quality Modelling*. vol. 224, p. 135-150.
- Gomez-Hernandez, J., and S.M. Gorelick. 1989. Effective groundwater model parameter values: Influence of spatial variability of hydraulic conductivity, leakance and recharge. *Water Resources Research*. vol. 25, no. 3, p. 405-420.
- Greenwald, R.M., and S.M. Gorelick. 1989. Particle travel times of contaminants incorporated into a planning model for groundwater plume capture. *Journal of Hydrology*. vol. 107, p. 73-98.
- Wagner, B.J., and S.M. Gorelick. 1989. Reliable aquifer remediation in the presence of spatially variable hydraulic conductivity: From data to design. *Water Resources Research*. vol. 25, no. 10, p. 2221-2225.
- Gomez-Hernandez, J. and S.M. Gorelick. 1990. Reply to comment by R. Ababou and E.F. Wood on "Effective groundwater model parameter values: Influence of spatial variability of hydraulic conductivity, leakance, and recharge." *Water Resources Research*. vol. 26, no. 8, p. 1847-1848.
- Gorelick, S.M. 1990. Large-scale nonlinear deterministic and stochastic optimization: Formulations involving simulation of subsurface contamination. *Mathematical Programming*. vol. 48, p. 19-39.
- Lefkoff, L.J. and S.M. Gorelick. 1990. Simulating physical processes and economic behavior in saline, irrigated agriculture: Model development. *Water Resources Research*. vol. 26, no. 8, p. 1359-1369.
- Lefkoff, L.J., and S.M. Gorelick. 1990. Benefits of an irrigation water rental market in a saline stream-aquifer system. *Water Resources Research*. vol. 26, no. 7, p. 1371-1381.
- van Genuchten, M. Th., S.M. Gorelick, and W. W-G. Yeh. 1990. Application of parameter estimation techniques to solute transport studies. Proceedings of the International Symposium on Water Quality Modeling of Agricultural Non-Point Sources. *Agricultural Research Service, ARS-81*, p. 731-752.

- Gvirtzman, H., and S.M. Gorelick. 1991. Dispersion and advection in unsaturated porous media enhanced by anion exclusion. *Nature*. vol. 352, p. 793-795.
- Gailey, R.M., A.S. Crowe, and S.M. Gorelick. 1991. Coupled process parameter estimation and prediction uncertainty using hydraulic head and concentration data. *Advances in Water Resources*. vol. 14, no. 5, p. 301-314.
- McCarty, P.L., L. Semprini, M.E. Dolan, T.C. Harmon, C. Tiedeman, and S.M. Gorelick. 1991. In-situ methanotrophic bioremediation for contaminated groundwater at St. Joseph, Michigan. *Proceedings of the International Symposium on In-situ and On-site Bioreclamation*, San Diego, California.
- Gvirtzman, H. and S.M. Gorelick. 1992. The concept of in-situ vapor stripping for removing VOCs from groundwater. *Transport in Porous Media*. vol. 8, no. 1, p.71-92.
- Koltermann, C., and S.M. Gorelick. 1992. Paleoclimatic signature in terrestrial flood deposits. *Science*. vol. 256, p. 1775-1782.
- Gailey, R.M. and S.M. Gorelick. 1993. Design of optimal, reliable plume capture schemes: Application to the Gloucester landfill groundwater contamination problem. *Ground Water*. vol. 31, no. 1, p. 107-114.
- Gvirtzman, H. and S.M. Gorelick. 1993. Using air-lift pumping as an in-situ aquifer remediation technique. *Water Science Technology*. vol. 27, no. 7-8, p. 195-201.
- Tiedeman, C. and S.M. Gorelick. 1993. Analysis of uncertainty in optimal groundwater contaminant capture design. *Water Resources Research*. vol. 29, no. 7, p. 2139- 2153.
- Haggerty, R. and S.M. Gorelick. 1994. Design of multiple contaminant remediation: Sensitivity to rate-limited transport. *Water Resources Research*. vol. 30, no. 2, p. 435-446.
- Harvey, C., R. Haggerty, and S.M. Gorelick. 1994. Aquifer Remediation: A method for estimating mass transfer rate coefficients and an evaluation of pulsed pumping. *Water Resources Research*. vol. 30, no. 7, p. 1979-1991.
- Hyndman, D.W., J.M. Harris, and S.M. Gorelick. 1994. Coupled seismic and tracer-test inversion for aquifer property characterization. *Water Resources Research*. vol. 30, no. 7, p. 1965-1977.

- James, B. and S.M. Gorelick. 1994. When enough is enough: The worth of monitoring data in aquifer remediation design. *Water Resources Research*. vol. 30, no. 12, p. 3499-3513.
- Bredehoeft, J.D., E.G. Reichard, and S.M. Gorelick. 1995. If it works, don't fix it: Benefits from regional groundwater management. Chapter 7, *Groundwater Models for Resources Analysis and Management*. Edited by A.I. El-Kadi, Lewis Publishers, p. 101-121.
- Harvey, C.R. and S.M. Gorelick. 1992. Mapping hydraulic conductivity: Sequential conditioning with measurements of solute arrival time, hydraulic head, and local conductivity. *Water Resources Research*. vol. 31, no. 7, p. 1615-1626.
- Haggerty, R. and S.M. Gorelick. 1995. Multiple-rate mass transfer for modeling diffusion and surface reactions in heterogeneous media. *Water Resources Research*. vol. 31, no. 10, p. 2383-2400.
- Harvey, C.R. and S.M. Gorelick. 1995. Temporal moment generating equations: Modeling transport and mass-transfer in heterogeneous aquifers. *Water Resources Research*. vol. 31, no. 8, p. 1895-1911.
- Koltermann, C. and S.M. Gorelick. 1995. The fractional packing model for hydraulic conductivity derived from sediment mixtures. *Water Resources Research*. vol. 31, no. 12, p. 3283-3297.
- Wilson, A. and S.M. Gorelick. 1996. The effects of pulsed pumping on land subsidence in the Santa Clara Valley, California. *Journal of Hydrology*. no. 174, p. 375-396.
- Koltermann, C. and S.M. Gorelick. 1996. Heterogeneity in sedimentary deposits: A review of structure-imitating, process-imitating, and descriptive approaches. *Water Resources Research*. vol. 32, no. 9, p. 2617-2658.
- Francois, O., T. Gilmore, M. Pinto and S.M. Gorelick. 1996. A physically based model for air-lift pumping. *Water Resources Research*. vol. 32, no. 8, p. 2383-2399.
- Hyndman, D.W. and S.M. Gorelick. 1996. Estimating lithologic and transport properties in three dimensions using seismic and tracer data: The Kesterson Aquifer. *Water Resources Research*. vol. 32, no. 9, p. 2659-2670.

- Gorelick, S.M. 1997. Incorporating uncertainty into aquifer management models. In: *Subsurface Flow and Transport*. G. Dagan and S.P. Neuman, editors, Cambridge University Press, p. 101-112.
- Fry, V.A., J.S. Selker, and S.M. Gorelick. 1997. Experimental investigations for trapping oxygen gas in saturated porous media for in situ bioremediation. *Water Resources Research*. v. 33, no. 12, p. 2687-2696.
- Gorelick, S.M. and M.J. Pinto. 1997. Removing VOCs from groundwater using in-well vapor stripping: Lab, field, and modeling. Proceedings of *International Conference on Groundwater Quality Protection*, Taiwan, p. 71-84.
- Ali, R., S.M. Gorelick, and J.V. Turner. 1998. Simulation-optimization of groundwater pumping from the Gwelup borefield, Western Australia. *CSIRO Land and Water Report No. 98-15*, 44 p.
- Haggerty, R. and S.M. Gorelick. 1998. Modeling mass transfer processes in soil columns with pore-scale heterogeneity. *Soil Science Society of America Journal*. vol. 62, no. 1, p. 62-74.
- Pinto, M., H. Gvirtzman, and S.M. Gorelick. 1998. Aquifer remediation by in-well vapor stripping: 2. Modelling results. *Journal of Contaminant Hydrology*. vol. 29, no. 1, p. 41-58.
- Harvey, C.H. and S.M. Gorelick. 1998. Rate-limited mass transfer or macrodispersion: Which dominates plume evolution at the Macrodispersion Experiment (MADE) site? *Water Resources Research*. vol. 36, no. 3, p. 637-650.
- Freeze, R.A. and S.M. Gorelick. 1999. Convergence of stochastic optimization and decision analysis in the engineering design of aquifer remediation. *Ground Water*. 37(6), p. 934-954.
- Day-Lewis, F.D., Hsieh, P.A., Shapiro, A.M., and Gorelick, S.M. 1999. Geostatistical simulation of high-transmissivity zones at the Mirror Lake Site in New Hampshire: Conditioning to hydraulic information. In: Morganwalp, D.W., and Buxton, H.T., eds, U.S. Geological Survey Toxic Substances Hydrology Program. vol. 3 Subsurface Contamination from Point Sources. *U.S.G.S. Resources Investigations Report 99-4018C*, p. 685-694.
- Day-Lewis, F.D., P.A. Hsieh, and S.M. Gorelick. 2000. Identifying fracture-zone geometry using simulated annealing and hydraulic connection data. *Water Resources Research*. vol. 36, no. 7, p. 1707-1721.

- Hyndman, D.W., J.M. Harris, and S.M. Gorelick. 2000. Inferring the relation between seismic slowness and hydraulic conductivity in heterogeneous aquifers. *Water Resources Research*. vol. 36, no. 8, p. 2121-2132.
- Goltz, M.N., R.K. Gandhi, S.M. Gorelick, G.D. Hopkins, and P.L. McCarty. 2001. Field experiments using in situ bioremediation to treat trichloroethylene (TCE)-contaminated groundwater. *In: Proceedings of the Spring Meeting of the Korean Groundwater and Soil Environment Society*. Hanyang University, Seoul, Korea.
- Goltz, M.N., R.K. Gandhi, S.M. Gorelick, G.D. Hopkins, C. LeBron, P.L. McCarty, and M. Reinhard. 2001. Application of circulating wells for in situ treatment of contaminated groundwater, *Proceedings of the International Symposium on Soil and Groundwater Contamination Control Strategy*. Kyung Hee University, Seoul, Korea.
- Day-Lewis, F.D., J.M. Harris, and S.M. Gorelick. 2002. Time-lapse inversion of crosswell radar data. *Geophysics*. vol. 67, no. 6, p. 1740-1752.
- Zheng, C. and S.M. Gorelick. 2002. Effect of decimeter-scale preferential flow paths on solute transport: implications for groundwater remediation. *In: Groundwater Quality: Natural and Enhanced Restoration of Groundwater Pollution*. Thornton, S.F. and S.E. Oswald, eds, *International Association of Hydrological Sciences Publication* no. 275, p. 463-469.
- Gandhi, R.K., G.D. Hopkins, M.N. Goltz, S.M. Gorelick, P.L. McCarty. 2002. Full-scale demonstration of in situ cometabolic biodegradation of trichloroethylene in groundwater, 1: Dynamics of a recirculating well system. *Water Resources Research*. vol. 38, no. 4, p. 10-1 to 10-15.
- Gandhi, R. K., G.D. Hopkins, M.N. Goltz, S.M. Gorelick, P.L. McCarty. 2002. Full-scale demonstration of in situ cometabolic biodegradation of trichloroethylene in groundwater, 2: comprehensive analysis of field data using reactive transport modeling. *Water Resources Research*. vol. 38, no. 4, p. 11-1 to 11-19.
- Ge, S., B. Bekins, J.D. Bredehoeft, K. Brown, E.E. Davis, S.M. Gorelick, P. Henry, H. Kooi, A.F. Moench, C. Ruppel, M. Sauter, E. Screaton, P.K. Swart, T. Tokunaga, C.I. Voss, F. Whitaker. 2002. Hydrogeology Program Planning Group Final Report. *Joint Oceanographic Institutions for Deep Earth Sampling Journal*. vol. 28, no. 2, p. 24-34.

- Day-Lewis, F.D., J.W. Lane, Jr., J.M. Harris, and S.M. Gorelick. 2003. Time-lapse imaging of saline-tracer transport in fractured rock using difference-attenuation radar tomography. *Water Resources Research*. vol. 39, no. 10, 1290. WR001722, 14 p.
- McCarty, P.L., S.M. Gorelick, M.N. Goltz, G.D. Hopkins, and F. Eisenberg. 2003. Operation and analysis of the BEHIVS system at Edwards Air Force Base, Final Report. *Western Regional Hazardous Substance Research Center*, 148 pp.
- Singha, K., A.M. Binley, J.W. Lane Jr., and S.M. Gorelick. 2003. Electrical imaging of tracer migration at the Massachusetts Military Reservation, Cape Cod. Symposium on the *Application of Geophysics to Engineering and Environmental Problems* (SAGEEP). Denver, Colorado, 14 p.
- Zheng, C. and S.M. Gorelick. 2003. Analysis of solute transport in flow fields influenced by preferential flowpaths at the decimeter scale. *Ground Water*. vol. 41, no. 2, p. 142-155.
- S. Ge, B. Bekins, J. D. Bredehoeft, K. Brown, E.E. Davis, S.M. Gorelick, P. Henry, H. Kooi, A.F. Moench, C. Ruppel, M. Sauter, E. Scream, P.K. Swart, T. Tokunaga, C.I. Voss, and F. Whitaker. 2003. Fluid flow in sub-seafloor processes and future ocean drilling. *EOS Transactions of the American Geophysical Union*. 84(16), p. 145-152.
- Feyen, L. and S.M. Gorelick. 2004. Reliable groundwater management in hydro-ecologically sensitive areas. *Water Resources Research*. vol. 40, W07408, 3WR0030, 14 p.
- Liu, G., C. Zheng, and S.M. Gorelick. 2004. Limits of applicability of the advection-dispersion model in aquifers containing connected high-conductivity channels. *Water Resources Research*. vol. 40, W08308, WR002735, 19 p.
- Dror, I., B. Berkowitz, and S.M. Gorelick. 2004. Effects of air injection on flow through porous media: Observations and analyses of lab-scale processes. *Water Resources Research*. vol. 40, W09203, WRR002960, 18 p.
- Wang, P.P, C. Zheng, and S.M. Gorelick. 2005. A general approach to advective-dispersive transport with multirate mass transfer. *Advances in Water Resources*. vol. 28, p. 33-42.
- Martin, N. and S.M. Gorelick. 2005. Semi-analytical method for departure point determination. *International Journal of Numerical Methods in Fluids*. vol. 47, p. 121-137.

- Feyen, L. and S.M. Gorelick. 2005. Framework to evaluate the worth of hydraulic conductivity data for optimal groundwater resources management in ecologically sensitive areas, *Water Resources Research*. vol. 41, W03019, doi:10.1029/2003WR002901, 16 p.
- Loheide, S. and S.M. Gorelick. 2005. A High-Resolution Evapotranspiration Mapping Algorithm (ETMA) with hydroecological applications at riparian restoration sites, *Remote Sensing of Environment*. vol. 98, p. 182-200, doi:10.1016/j.rse.2005.07.003
- Loheide, S.P. II, J.J. Butler, and S.M. Gorelick. 2005. Estimation of groundwater consumption by phreatophytes using diurnal water table fluctuations: A saturated-unsaturated flow assessment, *Water Resources Research*. vol. 41, W07030, doi:10.1029/2005WR003942, 14 p.
- Martin, N. and S.M. Gorelick, MOD_FreeSurf2D: a MATLAB surface fluid flow model for rivers and streams. 2005. *Computers and Geosciences*. vol. 31, p. 929-946.
- Singha, K. and S.M. Gorelick. 2005. Saline tracer visualized with electrical resistivity tomography: field scale spatial resolution and moment analysis, *Water Resources Research*. vol. 41, W05023, doi:10.1029/2004WR003460.
- Goltz, M., R. Gandhi, S.M. Gorelick, G. Hopkins, L. Smith, B. Timmins, and P.L. McCarty. 2005. Field evaluation of in situ source reduction of trichloroethylene (TCE) in groundwater using bio-enhanced in-well vapor stripping, *Environmental Science & Technology*. vol. 39, 8963-8970
- Gorelick, S.M., G. Liu, and C. Zheng. 2005. Quantifying mass transfer in permeable media containing conductive dendritic networks, *Geophysical Research Letters*. vol. 32, L18402, doi:10.1029/2005GL023512.
- Schoups, G., C.L. Addams, and S.M. Gorelick. 2005. Multi-objective calibration of a groundwater-surface water flow model in an irrigated agricultural region: Yaqui Valley, Sonora, Mexico, *Hydrology and Earth System Sciences*. vol. 9, 549–568.
- Day-Lewis, F., J.W. Lane, and S.M. Gorelick. 2006. Combined interpretation of radar, hydraulic, and tracer data from a fractured-rock aquifer, *Hydrogeology Journal*. Vol. 14, No. 1-2, p. 1-14
- Loheide, S.P. and S.M. Gorelick. 2006. Quantifying stream-aquifer interactions through analysis of remotely sensed thermographic profiles and in-situ temperature records, *Environmental Science & Technology*. 40, p. 3336-3341

- Molz, F.J., C. Zheng, S.M. Gorelick, and C.F. Harvey. 2006. Comment on “Investigating the Macrodispersion Experiment (MADE) site in Columbus, Mississippi, using a three-dimensional inverse flow and transport model” by Heidi Christiansen Barlebo, Mary C. Hill, and Dan Rosbjerg, *Water Resources Research*. 42, W06603, doi:10.1029/2005WR004265.
- Ronayne, M.J. and S.M. Gorelick. 2006. Effective permeability of porous media containing branching channel networks, *Physical Review E*. vol. 72, no. 2, 026035.
- Schoups, G., C.L. Addams, J.L. Minjares, and S.M. Gorelick. 2006. Sustainable conjunctive water management in irrigated agriculture: Model formulation and application to the Yaqui Valley, Mexico, *Water Resources Research*. vol. 42, W10417, doi:10.1029/2006WR004922, 19 p.
- Singha, K. and S.M. Gorelick. 2006. Effects of spatially variable resolution on field-scale estimates of tracer concentration from electrical inversions using Archie's law. *Geophysics*. 71(3), p. G83-G91.
- Singha, K. and S.M. Gorelick. 2006. Hydrogeophysical tracking of 3D tracer migration: The concept and application of apparent petrophysical relations, *Water Resources Research*. vol. 42, W06422, doi:10.1029/2005WR004568.
- Schoups, G., C. L. Addams, J. L. Minjares, and S. M. Gorelick. 2006. Reliable conjunctive use rules for sustainable irrigated agriculture and reservoir spill control, *Water Resources Research*. 42, W12406, doi:10.1029/2006WR005007.
- Selker, J.S., M. Niemet, N. G. McDuffie, S. M. Gorelick, and J-Y. Parlange. 2007. The Geometry of gas injection into saturated homogeneous porous media, *Transport in Porous Media*. 68 (1): 107-127 May 2007 doi: 10.1007/s11242-006-0005.
- Loheide, S. and S.M. Gorelick. 2007. Riparian hydroecology: A coupled model of the observed interactions between groundwater flow and meadow vegetation patterning, *Water Resources Research*. vol. 43, W07414, doi:10.1029/2006WR005233.
- Liu, G., C. Zheng, and S.M. Gorelick. 2007. Evaluation of the applicability of the dual-domain mass transfer model in porous media containing connected high-conductivity channels, *Water Resources Research*. vol. 43, W12407, doi:10.1029/2007WR005965.

- Moffett, K.B., S.W. Tyler, T. Torgersen, M. Menon, J. S. Selker, and S. M. Gorelick. 2008. Processes controlling the thermal regime of salt marsh channel beds, *Environmental Science and Technology*. doi:10.1021/es071309m
- Ronayne, M.J., S.M. Gorelick, and J. K. Caers. 2008. Identifying discrete geologic structures that produce anomalous hydraulic response: An inverse modeling approach, *Water Resources Research*. vol. 44, W08426, doi:10.1029/2007WR006635.
- Violette, S., G. Boulicot, S. M. Gorelick. 2009. Tsunami-induced groundwater salinization in southeastern India, *Comptes Rendus Geoscience* (of the French Academy of Science). vol. 341, issue 4, 339-346.
- Liu, G., C. Zheng, G. Tick, J.J. Butler, and S.M. Gorelick. 2010. Relative Importance of Dispersion and Rate-limited Mass Transfer in Highly Heterogeneous Porous Media: Analysis of a New Tracer Test at the MADE Site, *Water Resources Research*. vol. 46, doi:10.1029/2009WR008430.
- Moffett, K. B., A. Wolf, J. A. Berry, and S. M. Gorelick. 2010. Salt marsh - atmosphere exchange of energy, water vapor, and carbon dioxide: effects of tidal flooding and biophysical controls, *Water Resources Research*. vol. 46, doi:10.1029/2009WR009041.
- Srinivasan, V., S. M. Gorelick, and L. Goulder. 2010. A hydrologic-economic modeling approach for analysis of urban water supply dynamics in Chennai, India, *Water Resources Research*. vol. 46, W07540, doi:10.1029/2009WR008693.
- Michael, H., H. Li, A. Boucher, T. Sun, J. Caers, and S.M. Gorelick. 2010. Combining geologic-process models and geostatistics for conditional simulation of 3-D subsurface heterogeneity, *Water Resources Research*. vol. 46, W05527, doi:10.1029/2009WR008414.
- Srinivasan, V., S. M. Gorelick, and L. Goulder. 2010. Sustainable urban water supply in South India: Desalination, Efficiency Improvement, or Rainwater Harvesting?, *Water Resources Research*. vol. 46, doi:10.1029/2009WR008698.
- Srinivasan, V., L. Goulder, and S.M. Gorelick. 2010. Factors determining informal tanker water markets in Chennai, India, *Water International*. vol. 35, no. 3, p. 254-269.
- Ronayne, M.J., S.M. Gorelick, and C. Zheng. 2010. Geological modeling of sub-meter scale heterogeneity and its influence on tracer transport in a fluvial aquifer, *Water Resources Research*. vol. 46, W10519, doi:10.1029/2010WR009348.

- Moffett, K. B., D. A. Robinson, and S.M. Gorelick. 2010. Relationship of salt marsh vegetation zonation to spatial patterns in soil moisture, salinity and topography, *Ecosystems*, doi: 10.1007/s10021-010-9385-7.
- Zheng, C., M. Bianchi, and S.M. Gorelick. 2010. Lessons learned from 25 years of research at the MADE site, *Ground Water*, vol. 49, no. 5, p. 649-662, 662, doi: 10.1111/j.1745-6584.2010.00753.x.
- Bianchi, M., C. Zheng, G. R. Tick, and S. M. Gorelick. 2011. Investigation of small-scale preferential flow with a forced-gradient tracer test, *Ground Water*, doi: 10.1111/j.1745-6584.2010.00746.x
- Bianchi, M., C. Zheng, C. Wilson, G. Tick, G. Liu, and S.M. Gorelick. 2011. Spatial connectivity in a highly heterogeneous aquifer: From cores to preferential pathways, *Water Resources Research*, vol. 47, doi:10.1029/2009WR008966.
- Moffett, K.B. and S.M. Gorelick. 2012. A method to calculate heterogeneous evapotranspiration using sub-meter thermal infrared imagery coupled to a stomatal resistance submodel, *Water Resources Research*, Volume: 48, doi: 10.1029/2011WR010407.
- Moffett, K.B., S.M. Gorelick, R. McLaren, E. Sudicky. 2012. Salt marsh ecohydrological zonation due to heterogeneous vegetation - groundwater - surface water interactions, *Water Resources Research*, 48, doi:10.1029/2011WR010874.
- Zoback, M.D. and S.M. Gorelick. 2012. Earthquake triggering and large-scale geologic storage of carbon dioxide, *Proc. National Academy of Sciences*, doi/10.1073/pnas.1202473109.
- Srinivasan, V., E. F. Lambin, S. M. Gorelick, B. H. Thompson, and S. Rozelle. 2012. The nature and causes of the global water crisis: Syndromes from meta-analysis of couples human-water studies, *Water Resources Research*, vol. 48, W10516, doi:10.1029/2011WR011087.
- Moffett, K.B. and S.M. Gorelick. 2013. Distinguishing wetland vegetation and channel features with object-based image segmentation, *International Journal of Remote Sensing*, vol. 34, No. 4, 20 February 2013, 1332–1354, doi/10.1080/01431161.2012.718463.

BOOKS

- Peck, A.J., S.M. Gorelick, G. de Marsily, S. Foster, and V. Kovalevsky. 1988. ***Consequences of Spatial Variability in Aquifer Properties and Data Limitations for Groundwater Modelling Practice***. International Association of Hydrologic Science Redbook Series, Intl. Assoc. of Hydrologic Sci. Press, Publ. no. 175, 272 p.
- Gorelick, S.M., R.A. Freeze, D. Donohue, and J.F. Keely. 1993. ***Groundwater Contamination: Optimal Capture and Containment***. Lewis Publishers, Chelsea, Michigan, 385 p.
- Gorelick, S.M. 2010. ***Oil Panic and the Global Crisis : Prediction and Myths***. Wiley-Blackwell, Chichester, UK, 242 p., ISBN: 978-1-4051-9548-5

PATENTED INVENTIONS

- Gorelick, S.M., and H. Gvirtzman. 1993. In-situ vapor stripping for removing volatile organic compounds from groundwater, 1. *U.S. Patent* 5,180,503.
- Gorelick, S.M., and H. Gvirtzman. 1995. In-situ vapor stripping for removing volatile organic compounds from groundwater, 2. *U.S. Patent* 5,389,627.
- Gorelick, S.M., 2006, Methods and systems for automatically determining and collecting a monetary contribution from an instrument, *US Patent* 7,080,775.

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